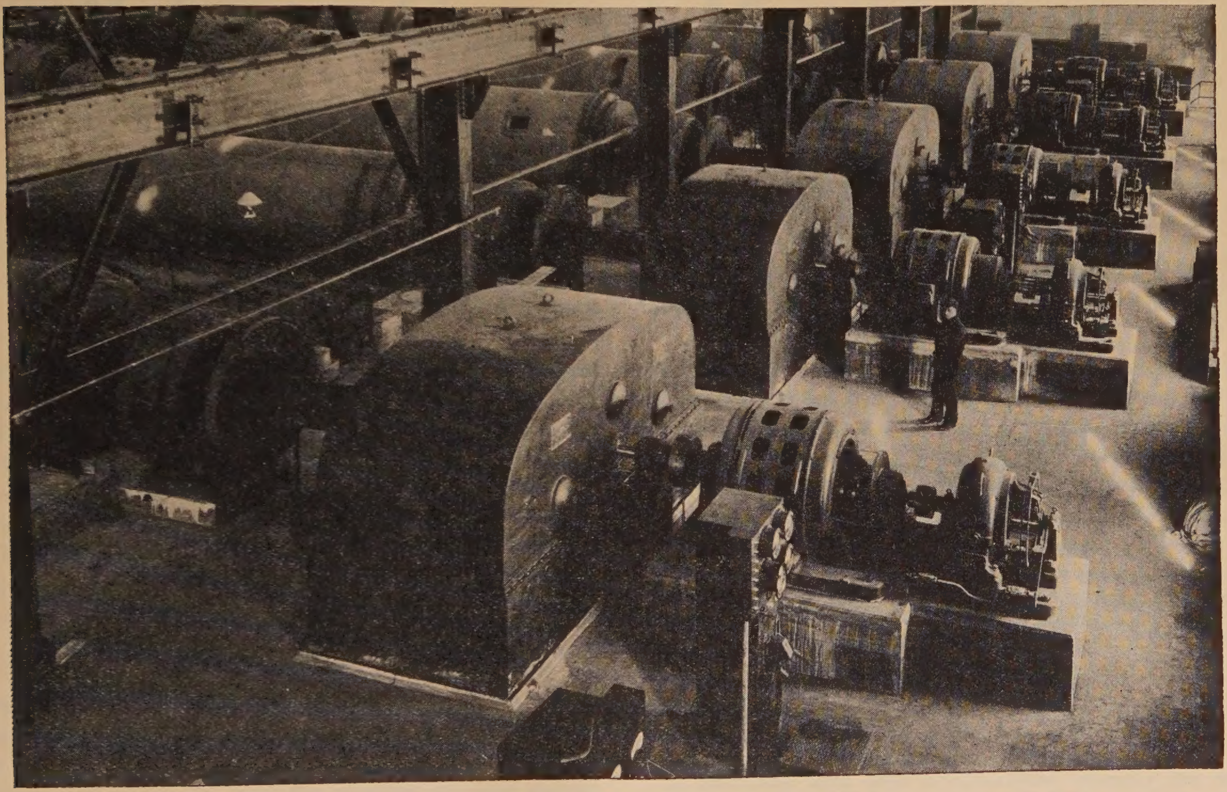
CEMENT MILL SECTION of
Concrete

UNI-KOM

GRINDING MACHINES WITH SYMETRO DRIVES



FLS

THE UNI-KOM* is the latest development in grinding mills. It combines in one machine the Unidan mill with the Kominuter, the Kominuter section being ***overhung*** on the feed end of the Unidan section. A special type of slide shoe bearing is used for the trunnion between the two mill sections.

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The motor is direct connected through the SYMETRO gear reduction unit to the outlet end of the Unidan mill section.

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CEMENT MILL SECTION of
Concrete

The Cement Mill Edition of Concrete is edited exclusively for those interested in the manufacture of portland cement. Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.

The Cement Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition. The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.

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CEMENT MILL SECTION of
Concrete
Vol. 39 Chicago, October, 1931 No. 4

Compares Performance of Rotary Kilns in Cement Manufacture

Merits of Short and Long Kilns—Problems and Experiments at Individual Plants—the Kiln Operator—Summary of Recommendations on Kiln Control

By ALTON J. BLANK
General Superintendent and Supervising Chemist, Compania de Cemento Portland "Landa," S. A., Puebla, Puebla, Mexico

ONE of the largest moving pieces of machinery in the world is the rotary kiln used in the burning of portland cement, yet its operation is usually supervised by only one man; and in the greater number of cases more than one and as many as six of these units are in the care of one man, this depending upon their size and the complications involved in connection with their operation.

The cost of installation of a rotary kiln constitutes one of the major items in the building of a cement plant, while the refractory lining that protects the kiln shell from the intense heat required in the cement burning process represents a small fortune in itself.

The method under which the kiln is operated determines to the larger degree the ultimate cost and quality of the cement produced, and the greatest of care should be taken in the selection of the men who supervise its operation. Ofttimes this is not done.

Kiln Sizes and Shapes

When rotary kilns were first introduced into the cement industry the dimensions considered as most suitable, from a productive and mechanical standpoint, were those in the ratio of 10 ft. of length to each one of diameter. However, as the mechanical difficulties were overcome these ratios were increased to 15 to 1, 20 to 1, and of late years to 40 to 1, until at the present time there is no standard, seemingly, as kilns are being constructed in all sizes in so far as shapes and length are concerned.

Judging from the variety of kilns placed in operation in new and existing cement plants during the past several years it would appear that each operator has his pet theory as to the size and shape a kiln should be in order that maximum output of a high quality cement may be produced with a minimum of kiln fuel.

While the writer is not prejudiced in favor of the smaller units, or against the rapid advances that have been made in kiln design and construction during the past few years, he still believes the rotary kiln to be far away from 100 per cent operating efficiency. Though appreciating to the fullest extent the steps that have been taken to eliminate wastage in fuel, and to better the quality of the product as a whole, it would appear that more or less the same results are now being obtained with the extremely large units that were obtained with the smaller units a number of years ago, when all phases of kiln operation are taken into consideration.

Operating Comparisons Between Small and Large Kilns

In checking over data accumulated recently the writer was interested in finding this to be true in comparing kiln operation costs of a dry-process cement plant utilizing 6 by 60-ft. kilns with those of a wet-process cement plant where kilns of 10 and 11 ft. by 300 ft. plus were in service.

As regards the plant utilizing 6 by 60-ft. kilns, it was found that the output over a period of years averaged well within the Portland Cement Association's figure of 1 bbl. of clinker per hr. per 100 sq. ft. of kiln heating surface. The fuel consumption per barrel of clinker output averaged 100 lb. of 12,000 B.t.u. coal.

Maintenance and repair costs of the smaller kilns, inclusive of the refractory lining item, were found to be somewhat smaller, as were charges of an extraordinary nature made during shutdown periods caused by mechanical and refractory difficulties. Dust losses and power consumption charges for the smaller units were found to be somewhat higher. The quality of the cement produced from the small kilns was found to be more uniform from day to day, though the average soundness, time of set, and strength were found to be more or less the same as that of the cement produced in the large units when these averages were taken over a period of one month.

With the larger units of 10 and 11 ft. by 300 ft. plus, the output taken over a period of months was found to be only 0.94 bbl. of clinker per hour per 100 sq. ft. of heating surface. The fuel consumption per barrel of clinker output averaged 105 lb. of 12,500 B.t.u. coal.

Shutdowns due to mechanical and lining difficulties were more frequent for the larger kilns. Dust losses and power charges per barrel of clinker output were somewhat smaller for the large units. The average quality of the cement produced with the larger units showed a considerable variation from day to day, though when figured over a period of one month compared favorably with the quality of the cement produced in the small kilns.

It may be stated here that the smaller kilns had a heating surface of approximately 1,000 sq. ft. and were operated on natural draft, while the larger kilns had a heating surface approximately ten times as great and were operated upon forced draft.

It may also be stated that there were only several of the larger kilns in operation in the wet process plant as compared with over three times that number of smaller kilns in operation in the dry process plant from whose operating data these conclusions were formed. Incidentally, the raw mixture fed to the larger wet process kilns averaged 4.0 per cent finer through the 200-mesh sieve than the raw mixture fed to the shorter dry process kilns.

Performance of Kilns of Medium Size

Comparing data accumulated over a period of several years at a second dry process cement plant utilizing 10 by 150-ft. kilns, it is found that when these kilns were pushed for capacity an output of 1.5 bbl. of clinker was produced per hr. per 100 sq. ft. of heating surface at a consumption of 120 lb. of 12,000 B.t.u. coal. When the same kilns were operated at normal capacity an output of 1.22 bbl. of clinker was produced per hr. per 100 sq. ft. of heating surface at a consumption of only 111 lb. of 12,000 B.t.u. coal.

Maintenance and repair costs, inclusive of refractory lining, were found to be more or less in line with those costs obtained with the larger 10 and 11-ft. by 300-ft. plus wet process kilns, though the dust losses per barrel of clinker burned were slightly higher for the former.

Quality, as in the case of the 6 by 60-ft. kilns, was more uniform from day to day, but comparable with the product of the large kilns when averaged over a period of one month. The fineness of the raw mixture fed to the 10 by 150-ft. kilns was some 6.0 per cent coarser through the 200-mesh screen.

While these data are given to show comparative results obtained with small and large units, the fact remains that the diameter, length and shape of kilns are not the deciding factors in the cost and quality of the cements produced, since the mechanical attachments of the kiln together with the man element of supervision are yet to be considered.

Natural or Forced Draft?

With the smaller units, draft for combustion is usually derived through the medium of chimneys designed for the size kiln, while with the larger units installed in recent years, forced or artificial draft must be relied upon. Where kiln burners of the old school "swear" by the advantages to be had through draft dependent on the height of stack and rear end temperatures, plus the use of a damper system in isolated cases or on particular occasions, kiln burners of the new school find favor in the artificial or forced draft available through exhaust fans. While each seems to have its champions, it is the writer's opinion that the better results are to be obtained with natural draft, since better control and greater economies are to be had.

Fixed or artificial draft appears to be one of the evils encountered in rotary kiln operation, resulting in there being a deficiency or excess of air over that required. It is very seldom that a neutral atmosphere exists for any great period of time. This requires manipulation in the amount of raw mixture fed to the kiln, in the amount of kiln fuel, and in the draft, thus resulting in erratic operating conditions that reflect upon the kiln output, life of refractory lining, fuel consumption and quality of the product.

In so far as fuel economy is concerned, kilns utilizing preheated air from cooler installations operate at such an apparent stage of efficiency that inefficiencies resulting from artificial draft are not noticed and consequently not investigated.

Prefers Feeding Systems Attached to Kilns

With respect to methods used in feeding the raw material to the kiln, again, those kilns which are operated in connection with the kiln feeding system,—that is, a given amount of feed per kiln revolution—and those kilns which are operated independently of the feeding system, also have their champions. Other things being equal, the writer finds the feeding system attached to the kiln to give more satisfactory results in so far as output, fuel economy, uniformity in quality and ease in kiln operation is concerned. This also has a marked effect upon the life of the refractory lining. Regardless of what the speed of the kiln may be, the depth of material in the kiln should always be kept constant, since this not only preserves the lining but reflects upon the kiln production costs in general.

The Question of Kiln Speed

Where some operators prefer to operate the kiln at a high rate of speed with a minimum of feed, other operators claim the better results are derived through operation of the kiln at a slow speed with a maximum of feed. In the writer's opinion the better results are obtained with the former method, in so far as fuel economy and uniformity in product is concerned, since the lighter load of material has greater contact with the kiln lining, absorbing a greater amount of heat and being more uniformly burned. However, it is sometimes found that it is necessary to reline the burning zones of kilns more often when the kiln is operated at a high rate of speed with a maximum of feed. Thus the dollar and cents item must be found through experimentation.

Atomization and Combustion

It has only been in recent years that the atomization and combustion of fuel utilized in the burning of portland cement, whether powdered coal or fuel oil, has received any great consideration, though imperfect atomization and combustion naturally result in high fuel costs.

While the percentage of air required for complete combustion of the fuel is known, little attention is paid to the source, and more often than not the amount of air used in atomizing the fuel and the amount of air entering the kiln from the cooler or around the housing is unknown. In the case of kilns fired with powdered coal, low-pressure air is commonly used for atomizing the fuel, but in the case of oil-fired kilns, steam and high and low-pressure air is used for atomization, this depending upon conditions or the operator's point of view.

Due to mechanical considerations it is improbable that the future will find 100 per cent of the air required for combustion entering the kiln mixed with the fuel. However, there remains ample room for experimentation to determine what percentage of air mixed with the fuel gives the most economical results.

How Fuel Was Wasted

In a plant utilizing powdered coal as kiln fuel it was found that approximately 15 per cent of the powdered coal fed into the kiln found its way into the kiln dust chambers, and it was estimated that an additional 5 per cent of the total fuel escaped with the waste gases from the stack. Upon investigation it was estimated that of the total amount of air required for combustion, only some 15 to 20 per cent was introduced with the fuel. After speeding up the blower so that some 30 per cent of the total air was mixed with the fuel this situation was overcome.

At a second plant where crude oil was used as the kiln fuel and low-pressure air of 2 lb. was supplied to the burners for atomization, it was found that 1 to 2 per cent of carbon monoxide was practically always to be found in the waste kiln gases. Of the total amount of air required for combustion, possibly 10 per cent was mixed with the fuel, and upon increasing the volume of air to something more than double the quantity supplied theretofore, it was found that the carbon monoxide content of the waste kiln gases was appreciably reduced. Upon further experimentation with the blower equipment at hand it was found that by increasing the pressure to between 2.75 and 3.25 lb. the carbon monoxide content of the waste gases was reduced to a minimum.

Experiments at Individual Plants May Bring Fuel Economy

These results all seem to point to the possibilities of further economies in kiln fuel consumption through means of experiments carried out at individual plants with the volume and pressure of air introduced with the fuel; and although the introduction of all the air required for combustion may not be necessary or attained through the blowers supplying the air for atomization, it is to be supposed that a happy medium will be reached in the majority of installations through the introduction of from 25 to 75 per cent of the total air required. However, these conclusions are only to be reached through experiments carried out on a large scale with individual units.

Analyzing the Kiln Gases

In any program pertaining to the conservation of kiln fuel, it is a matter of necessity that the waste kiln gases be analyzed at regular intervals, whether by means of the man element and the Orsat type of apparatus, or by means of the several mechanical recorders that are now finding their way on the market. Where the former apparatus represents no great outlay of money, the man element of operation comprises a considerable item. With the latter apparatus the initial outlay is considerable, but its operation requires little or no attention.

For the better kiln control to be exercised it is necessary that gas analyses be taken at least once each hour, day and night. Since this involves a considerable labor item when the smaller apparatus is used, it would appear to be cheaper in the long run to install a mechanical recorder, since these latter machines may be regulated so as to analyze the gases at regular intervals of a few minutes, or periods up to one hour. The kiln burner should naturally have some knowledge of combustion in order that these analyses may have some meaning to him.

Study and Care of Refractory Linings

The refractory lining item in kiln operation should come in for due study and consideration, since this may become one of the most expensive items in cement production when care is not taken to preserve it. Through indifference on the part of the kiln operator a lining may be ruined in the hot zone of the kiln in as short a time as several hours, regardless of whether the refractory lining is of alumina, silica or ordinary clinker composition. With the first named refractory lining a great many operators think less care is necessary than when the last two linings are used in a kiln, and it has usually been the writer's experience that, though the silica and clinker block linings have the shorter lives, greater care is taken to preserve them than is taken with the alumina liners.

It is usually found that when the linings in the kiln burning zone have decreased to thicknesses of 1 to 3 in., their life may be considerably prolonged by means of pouring a 3-in. to 5-in. thickness of clinker-cement mixture over the lining, though care must first be taken to thoroughly clean the exposed brick.

Importance of Kiln Operator's Post

As has been mentioned by the writer upon a number of occasions in previous articles having to do with cement manufacture, the position of the kiln operator in a cement plant is one of the most, if not the most, important of all posts. This operator is in a position to exercise the greatest influence upon cement manufacturing costs, as well as upon the quality of the product; and while it is not suggested that these positions be filled with university or college graduates having degrees in chemical engineering, it is to the advantage of the company to select the more intelligent men for this work.

Bonus System Recommended

The writer is a firm believer that kiln operations are made more economical when the kiln operators are placed upon a bonus system of pay, based upon kiln output, fuel consumption, life of lining and quality of product. In this manner the operator's incentive toward earning greater bonuses results in lower production costs.

An operator working on a straight wage scale has little incentive, if he is of a non-conscientious nature, to put forth his best efforts. An excuse is always available for use when kiln output drops, fuel consumption increases, when there are lining failures, or when the quality of the product is not what it should be, and he figures that there is glory in assuming responsibilities which can so easily be passed on to the plant foremen or the chemist.

By placing kiln operators upon a bonus system the writer has found kiln capacities to increase as much as 25 per cent, with usually a lower consumption of fuel per barrel of output, and at the same time it was found that lining failures occurred less frequently, and that less variation in the quality of the product was obtained.

Summary of Recommendations on Kiln Control

For the best control to be exercised in kiln operation it is necessary that draft gauges, temperature recorders and gas analyses apparatus be in use, and for the better all-around results to be obtained it is necessary that each kiln be subjected to a thorough series of experiments in order that a happy medium in its operation may be found.

Daily kiln reports covering the cause of kiln stoppages, lining failures, slowing up of production and variation in fuel consumption should be made out and kept on record in order that each case may be thoroughly studied out and remedied.

After all, the most important department of a cement plant should receive all of the consideration due it.

Cement Makers Register Protest Against Higher Freight Rates

Cement interests, in line with others, have filed protests with the Interstate Commerce Commission against the 15 per cent freight rate increase proposed by the railroads.

F. E. Paulson, vice-president of the Lehigh Portland Cement Co., recently testified that the increase would divert cement traffic to trucks and water routes.

He said there already was keen competition between railroads and trucks and higher rates would cut into the carriers' tonnage at a time when increased traffic was essential.

Paulson emphasized the frequency of short hauls on cement tonnage, pointing to it as one of the reasons why trucks would obtain much of the business now done by the railroads. The average haul in the territory north of the Ohio and Potomac rivers and east of the Mississippi was not more than 100 miles, he said.

Marquette Order Books Bulge; Other Plants Reopen

Having received two of the largest cement contracts to be awarded by private enterprises in Illinois for many months, the Marquette Cement Manufacturing Company is planning uninterrupted operation of its plant at Oglesby, Ill.

One hundred fifty men returned to work at the Valley Forge Cement Company plant at West Conshohocken, Pa., on September 1, after a month's shutdown. All departments resumed operation.

Officials of the Humboldt Cement Company anticipated that the plant at Humboldt, Kansas, would probably reopen about October 1 if conditions are satisfactory.

Following repairs and general overhauling of machinery during August, it was expected that the Florida Portland Cement Company plant at Tampa would reopen.

The Northwestern States Portland Cement Company will use most of its employes during the winter, B. A. MacDonald, manager, announced on September 5.

The Marquette contracts call for furnishing more than 350,000 barrels of cement to be used in two of the largest building operations undertaken in Chicago in years. More than 250,000 barrels will be used in the construction of the new postoffice building in Chicago and more than 100,000 barrels will be used in the building of the mammoth new building to be erected by the Marshall Field estate.

The company already has been awarded a contract to furnish the state of Illinois with 1,200,000 barrels for state road work.

Congress to Tackle Safety Problems During October at Chicago

Meetings of the Cement Section of the National Safety Congress, to be held at the Stevens Hotel, Chicago, in October, are scheduled for the 13th and 14th.

Because of the diversification of safety work and the applicability of methods in more than one field, officials of the Safety Council this year are advocating a more cosmopolitan attendance. They suggest that after sectional meetings have been completed, or during recesses, members visit other sections that are somewhat related. A complete schedule for Cement Section members, for the week, prepared with this purpose in mind, is available.

Registration will open on October 12. The first cement session scheduled will be held at 2 p. m., and will include a talk by W. L. White, Jr., assistant general manager of the Medusa Cement Company, on "The Relation of Labor Turnover to the Accident Curve."

The next day's session will continue all day, opening with an address by W. J. Fenton, of the American Red Cross, Washington, D. C., on the advantage to the employe of physical examination and re-examination. D. Harrington, chief engineer of the safety division, U. S. Bureau of Mines, Washington, D. C., will tell about coal dust explosions from the safety angle. A joint luncheon with the quarry section, as in previous years, is planned, followed by joint meetings with that section. At one of these A. A. Couchman, safety director for the North American Cement Corp., will lead an open discussion on "The Value of the Plant Magazine."

Portland Cement Association Holds Annual Meeting in November

The regular annual meeting of the Portland Cement Association is to be held at the Blackstone Hotel, in Chicago, on November 17 and 18.

In view of the recent favorable developments in the affairs of the association, centered mainly around the election of a full-time president, a large attendance is expected at this meeting.

Big Increase in Volume and Fineness With Air Separators

Mechanical Air Separator Used in Other Industries Is Successful in Cement Mills—Several Recent Cement Plant Installations — Excellent Performance Records

THE principles of air separation in the cement industry are well known in a general way, and the advantages to be gained from such separation are likewise understood in general terms.

When dealing with actual figures, however, the advantages of air separation can not be authoritatively expressed, except through actual performance records attained at cement mills. Only in rare cases will cement mill executives release information such as the increased output of tube mills, the reduced power requirements per ton of material ground, the range and distribution of fineness, and other pertinent data. This being true, much fragmentary data must of necessity be published, with the thought that in time a sufficient number of fragments may be fitted together to tell a complete story.

Fineness of Raw Mixture Affects Strength of Cement

Both laboratory tests and plant experience have demonstrated that the fineness and size distribution of the raw material fed into a cement kiln have a direct bearing on the strength of the resulting product. All other things being equal, the strength of the cement increases with increased fineness of the raw mixture.

The size distribution of the raw material fed into a kiln likewise affects the strength of the finished cement, mainly in the sense that improvement in size distribution improves the degree of chemical combination attained in burning.

Increased Output Through Greater Circulating Load

The most plainly evident advantage of any form of closed-circuit grinding is the increased output. In this respect air separation is no exception; yet air separation was in use in the cement industry for some years before advantage was taken of the possibilities in an increased circulating load. Not until that was done did the industry realize much economy in grinding costs.

Now the customary procedure is to build up a circulating load from three to five times greater than that of the former open-circuit rate of feed, and in some cases still greater. The most economical circulating load in any particular case in hand can be determined only by experiment, and will naturally depend on the hardness and other physical characteristics of the material being ground. Often the point of greatest economy is reached when the tube mill's discharge to the mechanical separator contains somewhere from 70 to 50 per cent of the material ground to the fineness required.

Two Recent Cement Mill Installations

Two recent air separator installations in cement mills located in the central states region are of special interest because of certain new principles utilized in the operation of this type of separator, and the good results being obtained. At the first plant seven 14-ft. separators were installed; the second plant has a battery of six 18-ft. units. The same type of separator has been installed in other cement mills, and in other industries; but the two installations here mentioned are the only cement mill installations where performance records are available.

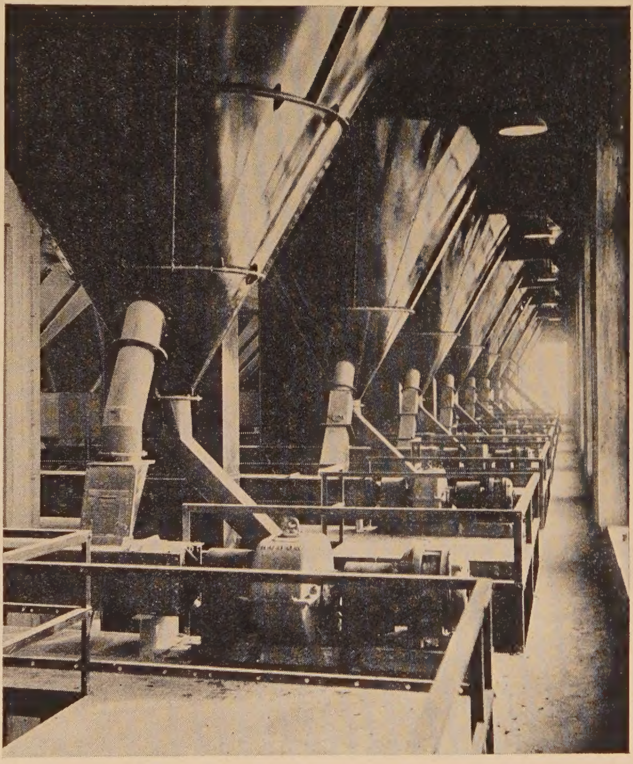


Figure 1. Battery of seven 14-ft. mechanical air separators hooked up with compeb mills in a mid-western cement plant

This air separator, like some others, utilizes centrifugal separation, but in conjunction with certain attachments in the nature of revolving whizzer arms that throw the coarse particles out of the air current. The separator contains an inner cone which in turn contains the rapidly revolving horizontal distribution disc upon which the tube mill product is first directed. The product enters the separator through a hollow vertical shaft at the top and drops upon the disc. The revolving of the disc has a tendency to throw the material over the edge and across the air space between the disc and the inner cone of the separator. At the same time the fan in the top of the separator is creating a large volume of circulating air which travels downward between the inner and outer cones, entering the inner cone through the deflector doors below, and then traveling upward through the inner cone.

This upward-moving air picks up all the dropping particles. The selection of the proper size material from these dropping particles is made by the whizzer arms previously mentioned, which knock the over-size particles out of the upward-traveling air current. The action of the whizzer arms results in a reduction of the amount of fine dust which, without them, would be discharged to the tailings. The whizzers have the further advantage of preventing a "leakage" of over-size material into the finish bin.

Performance of One Installation

The performance at one of the two cement mills where records are available is taken from test runs made in December, 1929, in November, 1930, and in January, 1931.

At this plant seven 14-ft. separators are hooked up with compeb mills in the raw grinding department. The mills on which the tests were run averaged 18 tons per hour, ground to a fineness of 87 to 88 per cent passing the 200-mesh screen, under the old open-circuit grinding methods employed before the hook-up with the separators.

Test Results in December, 1929

When the test was run on one of the units on December 20, 1929, the shutters were closed 4 in. in diameter from the wide open position. A 24-blade whizzer and a 12-blade fan were used. The test results were as follows:

Test Run of December 20, 1929:

Tons in storage bin ahead of mill	122.0
Time of start	7:45 A.M.
Time finished	12:45 P.M.
Elapsed time	5 hrs.
Tons per hour	24.4
Speed of separator	395 r.p.m.
Horsepower taken by separator motor	31.0

FINENESS REPORT

Time	Per cent of fines		Per cent of fines in mill discharge	
	Through 200-mesh	Through 100-mesh	Through 200-mesh	Through 100-mesh
8:00 A.M.	90.4	99.9	—	—
10:00 A.M.	90.6	99.9	75.2	93.4
12:00 M.	90.8	99.9	—	—

It will be noticed that the increase in tonnage from 18 to 24.4 is not a true measure of the improvement in this direction. Under the old open-circuit method the average production of 18 tons per hour had a fineness of only from 87 to 88 per cent passing the 200-mesh screen. With the closed-circuit hook-up between the compeb mills and the air separators the production of 24.4 tons per hour had a fineness ranging from 90.4 to 90.8 per cent passing the 200-mesh screen.

If the mills, under the old method, had been required to grind to an average fineness of 90.6 per cent passing the 200-mesh, the production would have been much less than 18 tons per hour.

Test Results in November, 1930

Tests on No. 5 and No. 2 separators were run on November 5, 1930, mainly because the grids in the compeb mills had been opened to deliver a coarser product to the separators, as a result of which certain adjustments were necessary on the separators to maintain a high fineness.

The test results on these two units were as follows:

No. 5 *Separator* (*November* 5, 1930):

Tons in storage bin ahead of mill	121.5
Time of start	7:15 A.M.
Time finished	12:05 P.M.
Elapsed time	4 hrs. 50 min.
Tons per hour	25.14
Circulating load, tons per hour (average)	45.0
Speed of separator	225 r.p.m.

FINENESS REPORT

Time	Per cent of fines		Per cent of fines in mill discharge	
	Through 200-mesh	Through 100-mesh	Through 200-mesh	Through 100-mesh
8:30 A.M.	90.4	99.4	64.0	83.0
9:30 A.M.	90.2	99.4	65.0	81.0
10:30 A.M.	90.2	99.4	63.0	81.0
11:30 A.M.	90.2	99.4	63.2	83.6

No. 2 *Separator* (*November* 5, 1930):

Tons in storage bin ahead of mill	121.5
Time of start	7:40 A.M.
Time finished	12:15 P.M.
Elapsed time	4 hrs. 35 min.
Tons per hour	26.5
Circulating load, tons per hour (average)	45.0
Speed of separator	225 r.p.m.

FINENESS REPORT

Time	Per cent of fines		Per cent of fines in mill discharge	
	Through 200-mesh	Through 100-mesh	Through 200-mesh	Through 100-mesh
8:30 A.M.	90.4	99.4	72.0	89.0
9:30 A.M.	90.4	99.4	66.6	84.0
10:30 A.M.	90.4	99.4	66.0	85.0
11:30 A.M.	90.4	99.4	68.0	84.2

Results in January, 1931

In the month of January, 1931, the average capacity of the seven 14-ft. units in this installation was 24.7 tons per hour. The average fineness was 91.45 per cent passing the 200-mesh screen, and the mill discharge averaged 69 per cent passing the 200-mesh screen.

Performance at Most Recent Installation

The performance of the air separator at the most recent cement mill installation is even more striking than in the one given above. The record that follows has reference to the first two separators in a battery of six that were installed at this plant.

These two are each 18 ft. in diameter, and are working in conjunction with two 8 by 47-ft. 3-compartment tube mills grinding raw material.

Previous to the installation of the separators, these mills produced 32 to 33 tons per hour to a fineness of 85 per cent passing the 200-mesh screen.

Since the hook-up with the separators each of the mills is producing 37 to 38 tons per hour of finished product ground to a fineness of 90 to 91 per cent passing the 200-

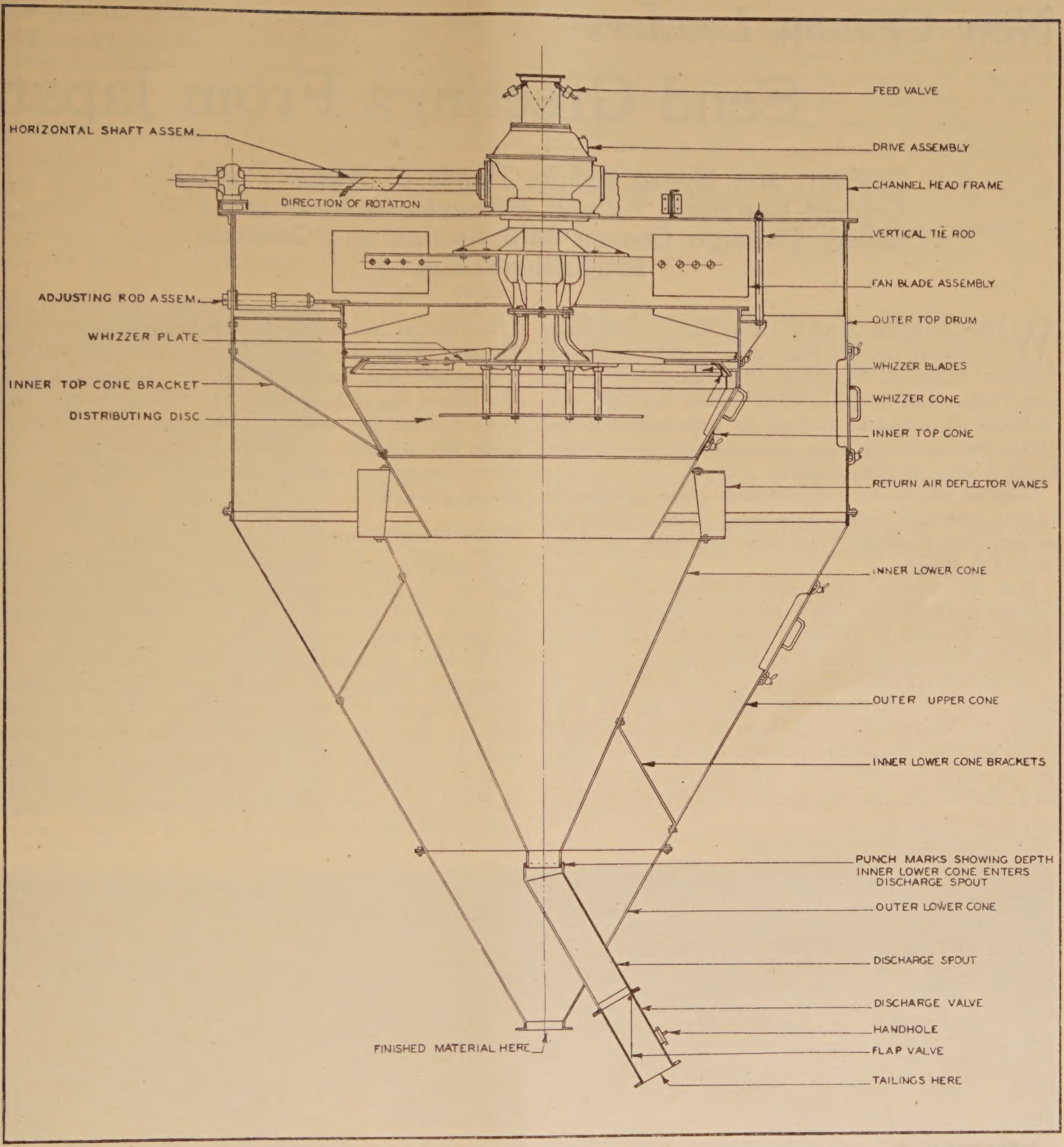


Figure 2. Details of 14-ft. mechanical air separator shown in Figure 1

mesh. It is estimated that if an attempt had been made to grind to a fineness of 91 per cent passing the 200-mesh screen, before the hook-up with the air separators, not more than 21 to 22 tons per hour could have been produced.

The actual tube mill fineness of 90 to 91 per cent passing the 200-mesh screen, now being attained, is being increased to about 92 per cent by mixing with the mill output the dust taken off by a dust collector installation.

Recent average figures from the first of the two separators show a feed material having 69.9 per cent passing the 200-mesh and a finished product averaging 90.7 per cent passing the 200-mesh screen.

This latter separator has been operated at speeds ranging from 185 to 200 r.p.m., with 190 r.p.m. adopted as the most satisfactory speed for the conditions encountered.

Acknowledgment

The mechanical air separators here described were manufactured and installed by Raymond Brothers Impact Pulverizer Co., of Chicago.

Canada Cement Declares Regular Quarterly Dividend

The Canada Cement Co., Ltd., Montreal, Canada, declared a regular quarterly dividend of \$1.62½ on 6½ per cent cumulative preferred stock, payable September 30 to stock of record August 31.

New Cement Leaders Send Greetings From Japan

Soichiro and Ryozo Asano, Heads of Asano Portland Cement Company, Extend Messages to American Producers Through Cement Mill Section of "Concrete"—Brief Biographies

WHEN the Asano Portland Cement Company of Japan was bereft through death of its founder and head, Soichiro Asano, in November, 1930, the latter's eldest son, Taijiro, took up the reins his father had held, and, as is the native custom, dropped his given name for that of his parent. Ryozo Asano succeeded his elder brother to the position of vice-president.

Together they head a company whose plants have sought to keep pace with modern ideas, many of them American, as they have developed. Two units have been completed in the last decade.

Both men have received either academic or practical training in the United States, and now, through the medium of CONCRETE, extend a brief message to fellow manufacturers on the North American continent.

Soichiro Asano was born in Tokyo on July 5, 1884. In preparation for his career, he studied at Waseda University in Tokyo, and later he went to the United States to get first-hand knowledge of the portland cement industry. To acquaint himself with every detail of the industry, he worked in different capacities at several of the more important cement plants.

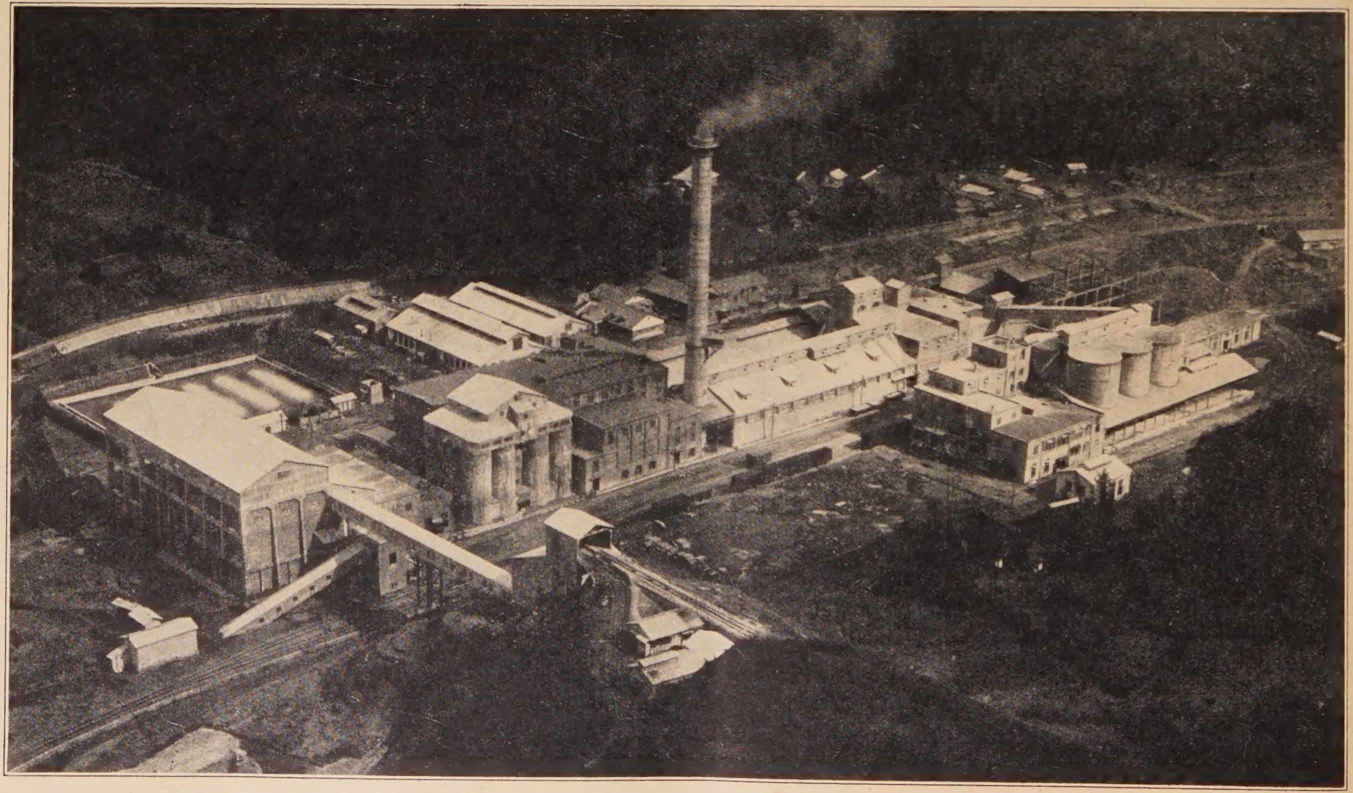
In 1906 he became one of the partners of the Asano Portland Cement Co., and later, when this company was reorganized as a limited stock corporation in 1912, he was elected one of its directors. In 1923 he was elevated to the position of managing director and, in 1927, he was made vice-president and director, in which position he served continuously until December of 1930, when he was elected president.

Heads Many Firms

In addition to his connection with the Asano Portland Cement Co., he is serving as president of 25 other corporations and as director of 18 additional enterprises, including cement companies, railway and steamship lines, shipbuilding companies, steel works, hydro-electric development companies, reclamation and harbor development companies and mining companies.

Ryozo Asano, the second son of the late Soichiro Asano, was born in the city of Tokyo, on August 28, 1889.

After graduating from Kaisei Middle School in Tokyo in 1907, Mr. Asano went to the United States to complete his education. He entered Harvard University, where



The Nishitama plant of the Asano Portland Cement Co., where Velo cement is manufactured

he studied economics and graduated with the class of 1912, receiving the degree of bachelor of arts.

Immediately after completing his work at Harvard, Mr. Asano returned to Japan to be associated with his father in the development of various industries. In 1913, he entered the service of Toyo Kisen Kaisha (Oriental Steamship Co.) and was elected a director of the company in 1916. For the next ten years he devoted himself to the task of improving trans-Pacific transportation.

In recent years he has been more actively connected with the Asano Portland Cement Co. In 1923 he was elected a member of the board of directors and, in 1926, he became one of the managing directors. In 1930 he was elected to the vice-presidency.

Soichiro Asano, president of the Asano Portland Cement Company

Mr. Asano is closely connected with many industries and is now serving on the boards of two portland cement companies and 42 other corporations, including railway and steamship companies, steel works, mining companies, shipyards and harbor development companies, reclamation and hydro-electric development companies.

Personal Greetings to American Cement Industry

In the message that follows, the new head of the Asano Portland Cement Co. sends his greetings to the American portland cement industry.

Editor, CONCRETE:

I am very happy to have this opportunity of conveying my cordial greetings to the portland cement industry of America through your magazine, CONCRETE.

The portland cement industry of Japan was started only about sixty years ago as an experimental enterprise and since that time it has played an important part in the development of the modern industrial Japan.

From the very beginning and at the various stages of progress, our cement industry has been greatly indebted to America for valuable technical knowledge and experience. Personally, I received my first lessons in cement manufacturing at several of the great cement plants in America. Our own company has purchased many kilns and much machinery from American makers and, moreover, we have employed several American engineers at different times. We are happy to say that Paul C. Van Zandt, who is so well known in the cement industry in America, served, at one time, as a chief engineer of our company.

Our late president, who is looked upon as the father of the cement industry in Japan, was a great admirer of America and he was ever ready to adopt the most progressive methods. Succeeding him as president of Asano Cement Co., it is my earnest desire to follow in my father's footsteps and to co-operate with my good friends in America, for the further advancement of the industry not only in Japan and America but all over the world.

SOICHIRO ASANO, President,
Asano Portland Cement Co.

* * *

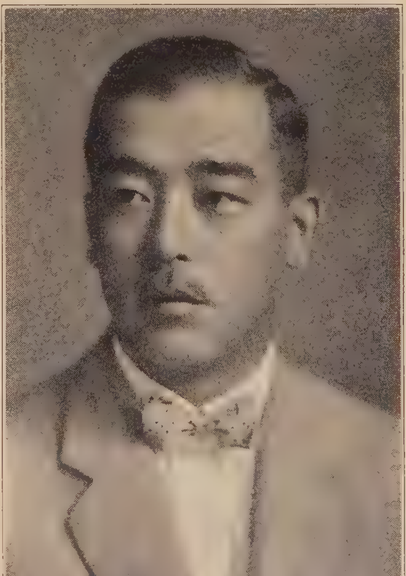
Ryozo Asano, recently elevated to the position of vice-president of the Asano organization, and who, like his elder brother, has studied and traveled in the United States, sends the following message:

Editor, CONCRETE:

I am very happy to have the opportunity of sending my sincere good wishes to the portland cement industry of America.

I am one of those who firmly believe that, without portland cement and iron, the great industrial development of the past half century could not have been possible.

It is impossible for me even to dream of New York without thinking of the importance of portland cement. In Japan, my late father, who was the president of the Asano Portland Cement Company until his death, turned his attention, fifty years ago, to the production of portland cement, in order to provide building material which would withstand fire and earthquake. Although portland cement was little known at that time, it has now become an indispensable material not only for building of great structures and execution of extensive public works but also for use even in agricultural households in out-of-way places.

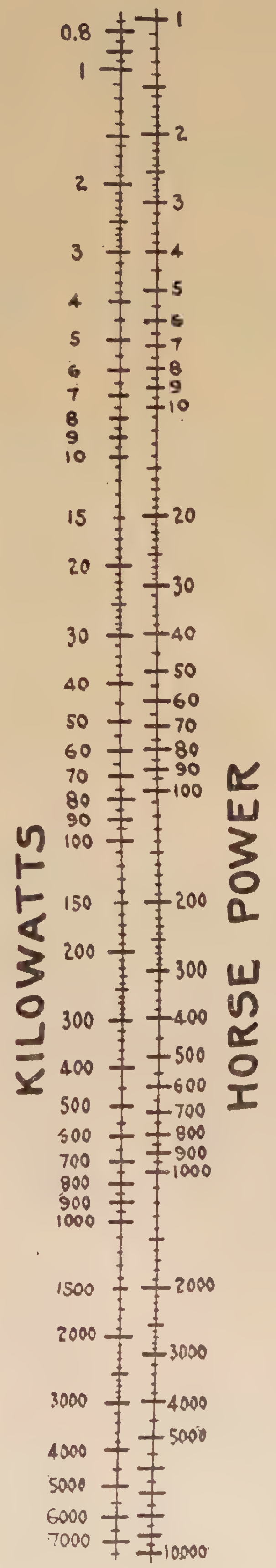


Ryozo Asano, vice-president of the Asano Portland Cement Company

Being connected with such an industry, it is most gratifying that in seeking for further improvement of products and for advancement of the industry, in general, we can work together with the best technical and business minds of America and other countries.

I want to say again that I am happy to have this opportunity of sending my greetings to my friends of the portland cement industry on the other side of the Pacific.

RYOZO ASANO, Vice-President,
Asano Portland Cement Co.



Kilowatt Horsepower Scale

By

W. F. SCHAPHORST

A scale that will be of interest to most engineers gives the kilowatts in any number of horsepower rapidly. Or, it will give the horsepower in any number of kilowatts. As will be noted, it is complete from 1, to 10,000 horsepower, within which range most power is included.

For example, how many horsepower in 1,000 kilowatts? Just glance from the 1,000 on the kilowatt side to the horsepower side, and the answer—1,350—is found.

Or, how many kilowatts in 1,000 horsepower? A glance across in the opposite direction gives the answer, 750 kilowatts. While the exact answer is 745.65 kilowatts, for most ordinary and practical purposes 750 will do.

New Books and Pamphlets

Low-Density Ammonia and Semi-Gelatin Dynamites Bulletin

An excellent 8-page bulletin entitled "Low-Density Ammonia and Semi-Gelatin Dynamites," has recently been published by E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.

Among other dynamiting work, the bulletin deals with quarry operations and the mining of non-metallic minerals. For quarrying operations these dynamites are recommended for three different purposes, namely, for the entire charge, for top loads, and for secondary blasting. For a bulky explosive to work well as a main charge, the stone must usually be of only medium hardness and the face relatively low (not more than 30 ft.) and without a heavy toe.

For underground quarrying or mining of limestone, a method which is coming into more and more extensive use, the low-density ammonia dynamites are exceptionally well suited. They are cohesive enough to be loaded easily in upward-pointing bore holes. With gelatin primers they can be used, if cartridges are not slit, in wet holes. They produce a large tonnage of stone per pound of explosive, they produce a minimum of fines, and they put the broken stone into an advantageous position for loading.

Book of Bureau of Standards Specifications

Standards and Specifications for Non-Metallic Minerals and Their Products. Prepared by John Q. Cannon, Jr., under the direction of A. S. McAllister, chief of the Division of Specifications, United States Bureau of Standards, Washington, D. C. Published by the U. S. Department of Commerce. Cloth binding, 680 pages, 7½ by 10½ inches, illustrated. For sale by the Government Printing Office, Washington, D. C., at $2.75 per copy.

The book represents an attempt on the part of the Department of Commerce to collect in published form the substance of standards and specifications relating to nonmetallic minerals and manufactures, formulated by national technical societies, trade associations having national recognition, or other organizations which speak for industry or with the authority of the federal government as a whole.

Specifications dealing with stone, sand and cementitious materials comprise 302 pages of the book. The specifications in this section cover the entire range of cement and concrete, concrete aggregates, concrete brick and hollow building units, and concrete construction work.

Geology of Illinois

List of Publications on the Geology of Illinois is the title of a 76-page, 6 by 9-in. bulletin published by the Division of the State Geological Survey, Urbana, Ill.

The list includes the titles and brief descriptions of several hundred bulletins, reports of investigations, press bulletins and related reports and investigations.

EDITORIAL

Vertical Shaft Kilns

A DEVELOPMENT in the European cement industry that is well worth watching is the growing interest in the modernized vertical shaft kiln for the burning of clinker.

A translated article printed elsewhere in this issue describes the operation of four kilns of this type in a reconstructed and modernized cement plant in Spain. Cement of high strength and uniform quality is being obtained. The kilns are automatic in their operation.

In Switzerland, within the last three years, a new cement plant has been built in which both rotary and vertical shaft kilns have been installed. The latter are designed to eliminate the necessity for briquetting the raw mix, and in other respects they are supplied with equally modern auxiliary equipment.

For many years following the appearance of the rotary kiln the vertical shaft kiln was neglected. The reappearance of the latter, in modernized, automatic form, is an interesting development that is well worth watching and studying.

Concrete Houses As Cement Market

"FOR thousands of years men built ships of wood," says Napoleon Hill, "because they believed that it was the only substance that would float. They had not advanced far enough in their thinking process to understand the truth that steel will float."

In a manner of thinking that is closely analogous, the American people have, for hundreds of years, built dwelling houses of wood, seemingly because they have believed it is the only material that is suitable for the construction of dwelling houses. Even in houses that have exterior walls of some form of masonry, the floors, stairs, partitions, roof—in fact everything except the exterior walls—are nearly always built of wood.

The people who live in these dwelling houses have seen the use of reinforced concrete and concrete-incased structural steel in the construction of our great modern buildings; but they have "not advanced far enough in their thinking process" to realize that this same form of construction could be adapted to single-family and two-family houses.

This is not in the least surprising, for it is a fact that no properly organized effort has ever been made to supply the American people with well planned, attractive houses of all-concrete construction.

True enough, many local efforts to build all-concrete dwelling houses were made in the first few years following the world war. Some of these were financed by industrial concerns, to supply dwelling places for their employes. Construction ceased when that special demand was supplied. Others were financed by private effort; but in most cases the capital on hand was woefully inadequate to permit large-scale production, even in a local sense.

Another trouble was that the cost of the concrete houses built in the first few years of the post-war period was, as a rule, about equal to that of similar houses of older forms of masonry construction, and somewhat higher than the cost of "houses of wood." In consequence, there was an absence of price inducement, and the home-buyer did not warm up to a change.

The all-concrete dwelling house of the future must be thoroughly attractive in appearance, and it must be marketed at a price considerably lower than the general run of dwelling house prices of today. Lower prices can be accomplished by construction on a large-scale production basis, by reduction of the present high cost of mechanical installations such as heating and plumbing, and by frying the fat out of financing.

The question is, then, whether the cement industry is big enough to promote the financing of an organization formed for the purpose of building all-concrete houses on a nation-wide scale, and selling those houses at prices which the average man who wants a home can afford to pay.

If the industry can promote such an undertaking, another large market for cement will have been opened.

Don't Miss the November Meeting

THE forthcoming annual meeting of the Portland Cement Association, to be held in Chicago on November 17 and 18, will be looked upon by many as an event of exceptional importance. In the minds of some observers, at least, this meeting will either prove or disprove the existence of a better feeling in the cement industry.

For that very reason the industry can not afford to leave any room for doubt as to its intentions. This meeting must be so well attended, and so much enthusiasm must prevail, that skeptics will find little to feed upon.

Every cement manufacturer who can possibly do so should participate in the November gathering. His presence will add just that much toward making the event what it should be—a demonstration in favor of progressive co-operation.

Such a meeting will bring the few remaining doubters down from the fence, and they'll climb down on the side of progress.

Manufacture High-Strength Cement in Modern Vertical Kilns

Kilns Designed for Automatic Operation—Reconstructed and Re-Equipped Goliat Plant Has Four in Operation—Modernization Doubles Strength of Cement

By AUGUSTO BUES
Director, Fabrica de Cemento Goliat, Malaga, Spain

Last month's *Cement Mill Section* of CONCRETE, pages 59 to 63, contains a detailed illustrated description of European experiments with the use of traveling grates for the burning, or sintering, of cement clinker. The experiments indicate possibilities in the reduction of fuel requirements, the cleaning of exit gases, and the reduced plant space occupied.

The following article, translated from the July issue of *Cemento* (Barcelona), tells of the manner in which a high-strength cement is being obtained by means of another European installation, namely, the modern automatic vertical kiln. The plant described has been completely reconstructed and modernized, during which the three old kilns were increased in height and a new one added. —The Editors.

THIS article has for its object that of contributing the author's modest effort toward the removal of the prejudice which exists, particularly in Spain, against cement produced in vertical kilns.

Consumers of cement in other countries usually value the product exclusively on the basis of its quality, without taking into account the system of production—a wise attitude, when dealing with portland cement.

How the Rotary Kiln Was Favored

It is undeniable that cement produced in rotary kilns is of better quality than that produced in vertical kilns of the old types. However, it is necessary to take into account that, with the advent of the rotary kiln, new processes of grinding were developed which favored, from the very beginning, the quality of rotary kiln production. The old type vertical kilns lacked this very important advantage.

Introduction of Automatic Vertical Kilns

Upon the introduction of automatic vertical kilns, the problem of calcination was believed solved with the installation of grating and ventilators. This demonstrates that the study of this type had been very superficial; especially when we consider that, until very recent times, coal of inferior quality was considered sufficiently good for burning.

Despite all of these deficiencies, there is no particular justification for the prejudice against cement produced by modern vertical kilns.

Inasmuch as the operation of the vertical kiln is more difficult, in all of its aspects, than that of the rotary kiln, it is logical that, for the sake of a good quality of pro-

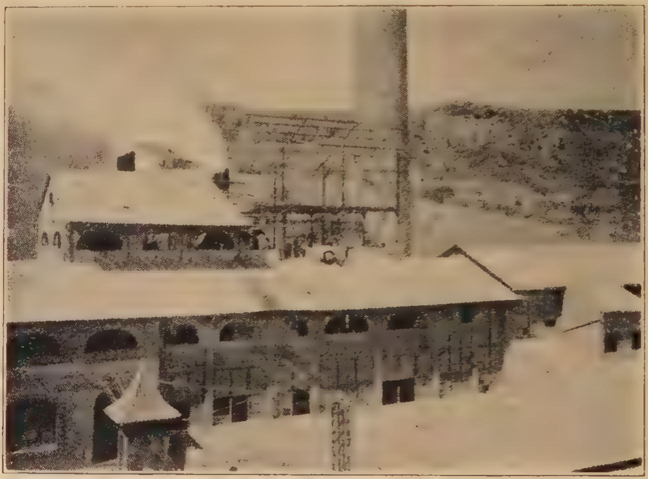


Figure 1. View of kiln building and kiln No. 1 after latter was increased in height

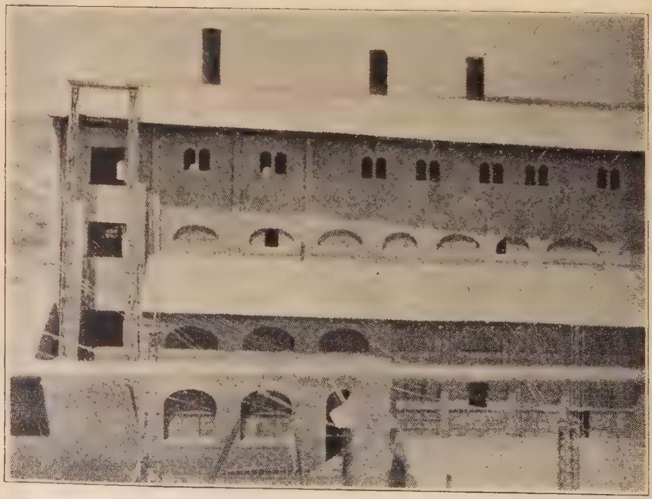


Figure 2. Kiln building completely finished, with three old kilns increased in height and fourth kiln added

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Translated from *Cemento* (Barcelona), July, 1931.

duction, auxiliary equipment should be developed that is suited to the necessities of the latter, and which previously had been lacking. On the other hand, the rotary kiln possessed all the advantages, from the beginning, of fine grinding, completeness of mixture, and other advantages, that brought its finished product to a successful termination.

Fundamentals Important with Both Types

The consequence of all this is that one encounters in the market more inferior cement produced by vertical kilns than by rotary kilns; but it is well worth observing, in accordance with general knowledge, that the rotary kiln in itself is not an absolute guaranty of superior cement. The writer himself has seen, in a plant installed in a foreign country, equipped with rotary kilns and of the wet process type, in a period when high-strength cement was not thought of, where test samples of this cement made up in 1:3 mortar resulted in 7-day strengths of 1,700 lb. per sq. in. But when placed under water for 28 days the samples were completely disintegrated, without evidence of expansion due to lime, magnesia or gypsum. With the same raw materials, and with a corresponding preliminary preparation, a cement was obtained which tested 7,110 lb. per sq. in. in compression in 7 days, and 9,250 lb. per sq. in. in 28 days.

One must conclude, in general, that for equal preliminary preparation, equal composition of raw materials, grinding to equal fineness, and similar raw mix, the fundamental conditions are of equal importance with the two types of kilns.

Actual Accomplishment with Vertical Kilns

I hope to be able to demonstrate with a practical example to what extent other factors have their influence toward attaining absolute uniformity in cement produced in automatic vertical kilns, even though it is not possible in this review to cover all details of this subject.

To this end I consider it both interesting and typical to describe the reconstruction and extension of the Goliat portland cement plant of the Sociedad Financiera y Minera, of Malaga, Spain.

Analyses of Limestone and Clay

The first materials to be taken into account are the limestone and the clay.

Analysis of limestone:

	Per Cent
Silica	1.15 to 4.25
Alumina	0.13 to 1.50
Iron oxide	0.10 to 2.50
Calcium oxide	47.00 to 54.00
Magnesia	0.50 to 1.50
Loss on ignition	39.00 to 42.00

Analysis of clay:

	Per Cent
Silica	38.00 to 43.00
Alumina	5.00 to 10.00
Iron oxide	5.00 to 7.00
Calcium oxide	18.00 to 23.00
Magnesia	2.00 to 3.50
Loss on ignition	18.00 to 22.00

As may be appreciated from the analyses described, these raw materials are of good quality for the manufacture of portland cement. However, the cement formerly manufactured did not meet technical requirements, each day more severe, and it became necessary to undertake energetically the reconstruction of this plant in order to obtain a high quality.

Reconstruction of Goliat Plant

In place of a jaw crusher, we have installed, in the same quarry, another hammer mill, with a capacity of 60 tons per hour. This hammer mill crushes the rock in a single passage to nut size, this fine material being transported, by means of a belt conveyor having a length of 500 ft. and a speed of 4.4 ft. per sec., to a bin of 1,300 cu. yd. capacity, previously existing.

The central discharge of this bin, filled with this small size material, supplies us with a suitable preliminary mixture, through its cone-shaped hopper, which feeds automatically to an underground belt conveyor which in turn transports the desired quantity to the limestone dryer. After the limestone is dried it is transported to a funnel-shaped bin.

For the crushing of marl-clay another hammer mill has been installed, similar to the one for limestone, but of less capacity, situated directly in front of the dryer, previously existing, to which the crushed material is transported on an inclined elevator. Once dried, it is deposited in another funnel-shaped bin similar to the one for crushed limestone.

The Storage Bins for Raw Material

The bins referred to are fitted with discharging devices in the form of plates, graduated for the regulation and blending of the two components, limestone and clay.

The devices for discharging limestone and clay are driven by a single shaft which is put in motion by means of a coupling and chain drive, as a consequence of which the quantities of graded limestone and clay remain uniform and can not be altered, except for the correction of the mixture, which is effected instantaneously.

Thanks to these installations, we receive from the mills a raw meal that is uniform in its calcium carbonate content.

The combination of limestone and clay is transported on another underground belt conveyor to 3-compartment mills with center drive, from which the pulverized material is transported to the raw storage bins by means of Fuller-Kinyon pumps.

Raw Meal and Fuel Pressed into Bricks

After an intimate mixture in ten bins, the raw meal passes to the agitators on an endless conveyor belt and is mixed with anthracite coal of high calorific value, from which a belt conveyor effects a distribution to the four double presses of Dorstener manufacture. Each one of these automatically carries the material in the form of pressed briquettes to elevators which in turn fill the automatic distributors in the kilns.

Increase Height of Kilns During Operation

With this description, we shall now consider the principal problem—the kilns. These formerly had a diameter of 11 ft. 6 in. and a height of only 26 ft. 3 in. In my opinion, here was the most serious defect in the old plant, apart from those previously noted with respect to crushing and grinding deficiencies.

We had to increase the height of the kilns by 14 ft. 9 in. without interruption of the manufacture of cement, making it necessary to overcome the difficulties which this work entailed.

Figure 1 shows the exterior of the building and the elevation of vertical kiln No. 1 (after the increase in height). In this illustration kilns Nos. 2 and 3 were still operating in their original condition (before being increased in height), with a daily production of 50 tons each. After the termination of this first work, with kiln No. 1 now increased to a height of 41 ft., it proceeded to produce, normally, 100 tons of clinker daily, thus assuring a capacity equal to that of the other two. With this assurance it was possible to undertake the reconstruction of Nos. 2 and 3.

Figure 2 shows the building completely finished, but with the addition of a fourth automatic vertical kiln with a capacity equal to the ones described.

All Equipment Modernized

All the new equipment is supplied with direct drive, some connected to motors with flexible couplings and others connected to motors with speed reducers. Thus each kiln has its own individual drive, its grating is reinforced, and sufficient ventilators are supplied.

The Kiln Discharge

The discharge from the kilns is effected automatically by means of the devices illustrated in Figure 3. The removal of the clinker that issues from the kilns, absolutely uniform in its calcination, is accomplished by a conveyor which transports it to storage bins whose capacity is 18,000 tons.

Clinker Storage

These clinker storage bins are fitted with automatic discharging devices, and belt conveyors and elevators conduct the clinker to the corresponding mills, also of the 3-compartment type and provided with center drive. The finished cement is transported to 16 large storage bins by a pneumatically-operated Fuller-Kinyon pumping system.

Points on Manufacturing Practice

Concerning standard practice in the development of automatic vertical kilns, much has been written without. up to the present, arriving at a standard.

However, fundamentally, it is possible to indicate the details and devices which serve as the basis for obtaining cements of high quality, but which I shall reserve for another article in which they will be set forth.

As is natural, this system requires kilns that can easily be inspected, in order to have an absolute guaranty that the clinker will continue to be of the same quality as with rotary kilns.

With this object in view we maintain a well-equipped chemical laboratory, where day and night the different phases of manufacture are recorded.

In our physical testing laboratory test samples are made up daily for the purpose of obtaining tests of strength in tension and compression at ages of 1 to 28 days, and monthly tests from 1 to 10 years.

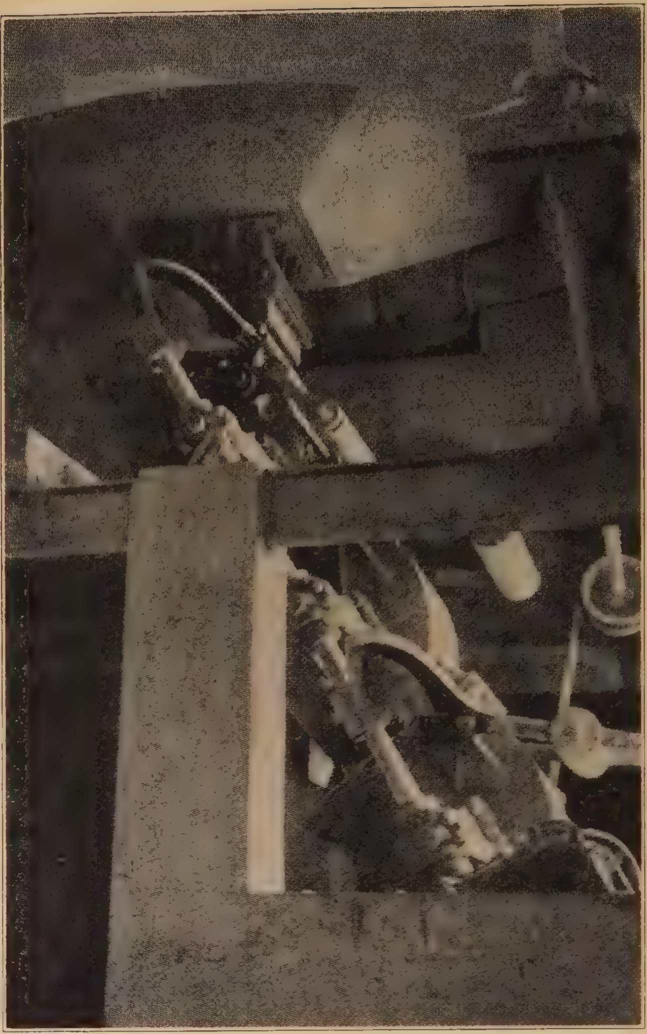


Figure 3. Automatic discharging device under vertical kiln

Modernization Doubles Strength of Cement

The data accumulated in the records of our laboratory demonstrated the progress in quality from the beginning of our reconstruction program to its completion, during which time we succeeded, without exaggeration, in doubling the compressive strength of mortars at ages of 7 and

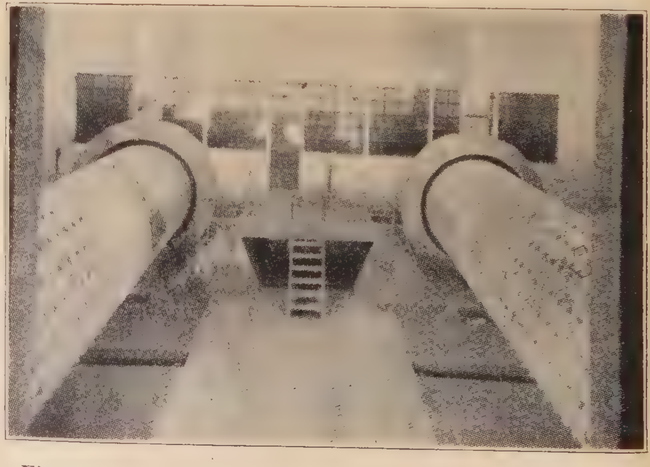


Figure 4. Three-compartment mills for grinding raw meal

28 days. The chemical analysis of our cement is shown in the following:

CHEMICAL ANALYSIS OF DRY CEMENT

	Per cent
Material insoluble in hydrochloric acid	0.17
Silica	20.53
Iron oxide	2.41
Alumina	5.42
Calcium oxide	66.06
Magnesium	2.07
Sulphuric anhydride	2.12
Other materials	.08
Loss on ignition	1.14
Total	100.00

STRENGTH OF MORTAR TEST SPECIMENS, LB. PER SQ. IN.

	Age of specimens at time of test		
	3 days	7 days	28 days
Tensile strength:			
Maximum	420	498	555
Average	405	476	491
Compressive strength:			
Maximum	5,830	6,755	7,825
Average	5,505	6,115	7,140

Note: Mortar mixtures were 1:3, with 8.5 per cent of water. The 3-day and 7-day specimens were stored in water until tested. The 28-day specimens were stored in water for 7 days and in air for 21 days.

Conclusions

In concluding the present article, the writer wishes to repeat that the manufacture of high-strength cement is possible in automatic vertical kilns, under the following fundamental conditions:

1. Provision for modern crushing methods.
2. Convenient blending of the dry raw meal.
3. Adequate grinding of the raw material and the clinker, in modern mills.
4. Automatic kilns, equipped with all necessary auxiliary devices.
5. Testing and inspection of the manufacturing process and the product, in an intensive manner.

Ideal Declares Dividend, Cut One-Third

The Ideal Cement Company, Denver, Colo., in declaring its quarterly dividend on common stock payable October 1 to stockholders of record September 15, reduced the amount from $3 to $2 per annum.

The payment of this dividend is partly from earnings and partly from reserve.

Italian Cement Production in 1930 Equals 1929

Production of portland cement in Italy in 1930 amounted to 34,823,628 quintals (about 20,890,000 American bbl.), compared with 34,974,158 quintals (about 20,980,000 bbl.) in 1929.

This good showing is credited mainly to activity in the construction of public works and industrial construction.

Production, Sale and Consumption of Cement in Spain

Data on Production, Exportation and Importation of Portland Cement in All Producing Countries

An attractive 76-page publication issued by the Ministerio de Fomento of the Spanish government at Madrid contains complete data on the production, sale, distribution and consumption of portland cement in Spain during 1930, and comparisons with 1929.

The Ministerio de Fomento is the governmental department that covers public works, manufactures, commerce, agriculture and education in the Spanish republic.

The following summary is given for the years 1929 and 1930:

	1929	1930
Sales, in tons	1,582,289	1,494,326
Production, in tons	1,608,602	1,608,041
Consumption, in tons	1,799,374	1,494,326

Among the detailed data included are the production and sales of the various cement companies, the distribution of cement by provinces, and the stocks on hand at the various plants at the end of 1930. Maps and tabulations show the name and location of all plants in Spain, which total 31 in number.

In addition, the publication contains useful figures on the production, exportation and importation of portland cement in all the producing countries of the world, for the years 1928 and 1929.

Brazilian Cement Dividend Follows Improved Conditions

The Canadian Foreign Investment Corp. declared a dividend of $4 on preferred stock, payable September 10 to stock of record September 5, clearing up arrears on this issue.

Last December the company, which controls the Brazilian Portland Cement Co., announced that in view of troubled conditions in Brazil dividend due January 1, 1931, would be deferred, although it had been earned. Last June the regular quarterly dividend of $2 was declared as the result of the improved outlook in Brazil, and the disbursement now declared clears up the dividend accumulation for the one quarter and provides for the quarterly payment now due, according to the *Wall Street Journal*.

Marquette to Make Waste Heat Installation at Oglesby Plant

The Marquette Cement Manufacturing Company has announced plans for the installation of new equipment for utilizing waste gases at the plant at Oglesby, Ill. The equipment will represent an investment of $250,000.

Announcement that installation of the equipment had been approved by the company's heads was made September 5 by Richard Moyle, Sr., operating head of the plant.

Installation will start this fall, it is said, and will proceed so as to avoid interference with the operation of the plant.

West Penn's Mining and Crushing Methods and Costs

Additional Operating Data and Detailed Summaries of Cost Data—Pay System and Safety Precautions Employed—Competition Between Mine Divisions—Organization Chart

By GEORGE A. MORRISON[1]

THE geology of the rock formations on the property of the West Penn Cement Co. and the mining methods employed in bringing out the Vanport limestone used as raw material were described in the August issue.

Loading and transportation methods, crushing plant operations, and related matters, were described in the September issue, together with tabulated data covering these operations.

This concluding installment contains additional operating data and summaries of cost data, together with brief comments on the pay system and safety methods employed.

Employes' Pay System

The mine is operated on a 6-day week basis of 8 or 10 hours daily, depending upon the tonnage required. Due to a fluctuating market, the working season varies somewhat, but 10 months is about the average year.

Except for about 18 per cent of the total, all labor is paid on an hourly basis, and wages vary from 45 to 80 cents per hour. The shale and some of the stone is loaded by hand on contract at a rate of $0.215 per ton, and it is this labor that accounts for the 18 per cent exception just noted.

Safety Precautions

Well-equipped first-aid cabinets are kept at various places throughout the mine and crushing plant. Each locomotive and shovel also carries a kit.

The mine is divided into three divisions, each under a separate boss. These divisions compete with each other for quantity of production and the least number of accidents. Three first-aid teams are kept in training, one team for each division of the mine.

Summaries of Cost Data

The accompanying tables contain detailed data on drill-

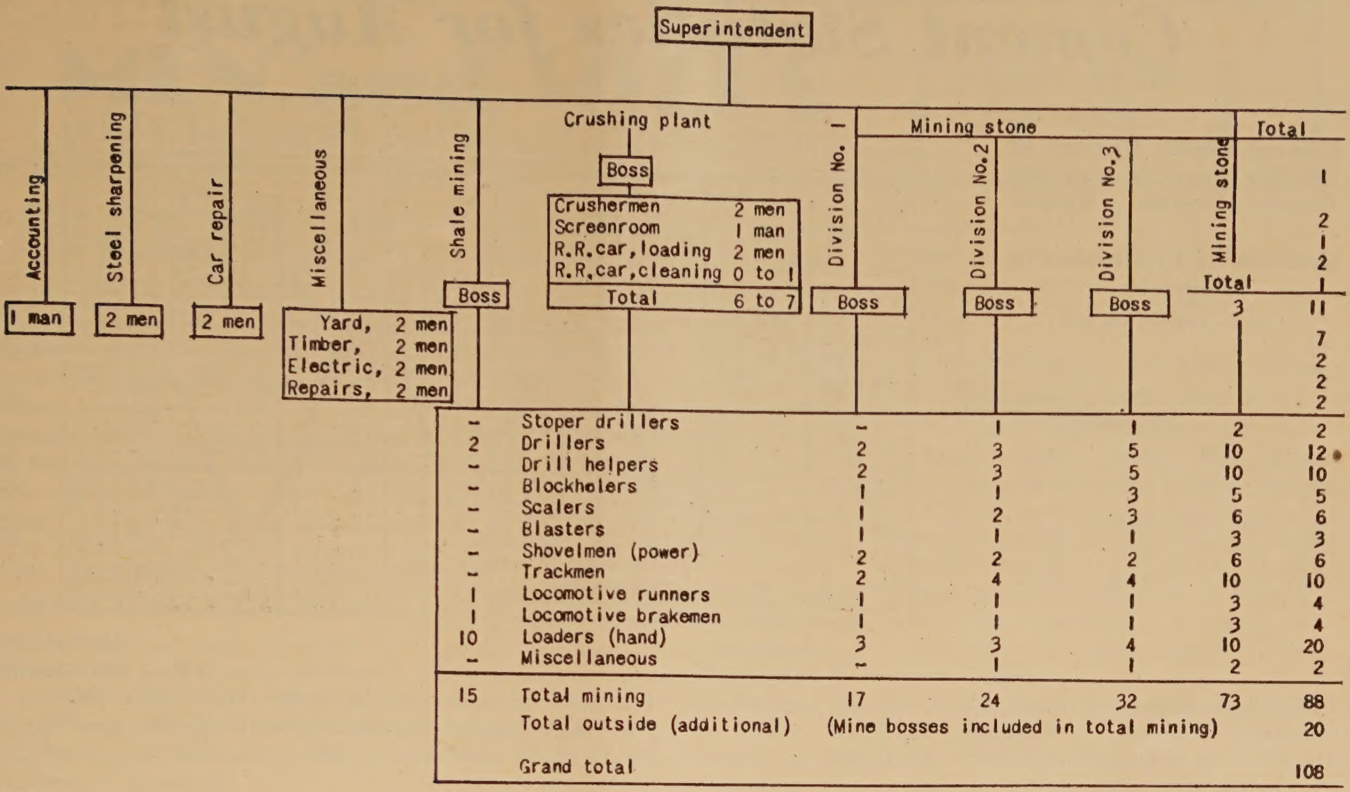
TABLE 6

Summary of Costs in Units of Labor, Power, and Supplies

	Mining			Crushing			Other			Total		
	Stone	Shale	Stone and Shale	Stone	Shale	Stone and Shale	Stone	Shale	Stone and Shale	Stone	Shale	Stone and Shale
A. Labor (man-hrs. per ton):												
Drilling	0.119	0.051	0.111	—	—	—	0.012	0.008	0.012	0.131	0.059	0.123
Blasting	0.017	0.010	0.016	—	—	—	—	—	—	0.017	0.010	0.016
Scaling	0.032	0.020	0.031	—	—	—	0.006	0.003	0.005	0.038	0.023	0.036
Loading:												
(A) Shovels	0.031	—	0.027	—	—	—	0.005	—	0.004	0.036	—	0.031
(B) Hand	0.075	0.329	0.105	—	—	—	—	—	—	0.075	0.329	0.103
Hauling:												
(A) Direct	0.049	0.050	0.050	—	—	—	0.032	0.033	0.032	0.082	0.082	0.083
(B) Track	0.062	0.036	0.058							0.062	0.036	0.058
Miscellaneous	—	—	—	—	—	—	0.025	0.025	0.025	0.025	0.025	0.025
Superintendent	0.023	0.024	0.023					—	—	0.023	0.024	0.023
Crushing	—	—	—	0.032	0.044	0.033	—	—	—	0.032	0.044	0.033
Total labor												
Average tons per man-shift	0.408	0.520	0.421	0.032	0.044	0.033	0.080	0.069	0.078	0.520	0.633	0.532
Labor, per cent of total	24.3	19.3	23.8	310	227	304	125	144	129	19.2	15.8	18.7
B. Power and Supplies:	—	—	—	—	—	—	—	—	—	47.5	72.5	49.6
Explosives, lbs. per ton	—	—	—	—	—	—	—	—	—	.685	.466	.655
Total power, kw. h. per ton	—	—	—	—	—	—					—	2.17
Shovels			0.41									.41
Locomotives	—	—	0.70	—	—	—	—	—	—	—	—	.70
Compressors	—	—	0.39	—	—	—	—	—	—	—	—	.39
Dump	—	—	—	—	—	0.02	—	—	—	—	—	.02
Crushers	—	—	—	—	—	0.52	—	—	—	—	—	.52
Screens	—	—	—	—	—	0.06	—	—	—	—	—	.06
Elevators	—	—	—	—	—	0.02	—	—	—	—	—	.02
Conveyors	—	—	—	—	—	0.04	—	—	—	—	—	.04
Washing	—	—	—	—	—	0.01	—	—	—	—	—	.01
Other supplies, per cent of total	—	—	—	—	—	—	—	—	—	—	—	10.7
Supplies and power, per cent of total	—	—	—	—	—	—	—	—	—	—	—	14.1
Per cent of total cost	—	—	—	—	—	—	—	—	—	—	—	78.5

Reprinted from U. S. Bureau of Mines Information Circular 6446.

[1] One of the consulting engineers, U. S. Bureau of Mines.



Shale mining		Division No. 1	Division No. 2	Division No. 3	Mining stone Total	Total
-	Stoper drillers	-	1	1	2	2
2	Drillers	2	3	5	10	12
-	Drill helpers	2	3	5	10	10
-	Blockholers	1	1	3	5	5
-	Scalers	1	2	3	6	6
-	Blasters	1	1	1	3	3
-	Shovelmen (power)	2	2	2	6	6
-	Trackmen	2	4	4	10	10
1	Locomotive runners	1	1	1	3	4
1	Locomotive brakemen	1	1	1	3	4
10	Loaders (hand)	3	3	4	10	20
-	Miscellaneous	-	1	1	2	2
15	Total mining	17	24	32	73	88
	Total outside (additional)	(Mine bosses included in total mining)				20
	Grand total					108

Figure 5. Organization chart

TABLE 7

Drilling Cost Data, January 1 to December 1, 1929

	Periods by Quarters First	Second	Third	Fourth	Total
Drill shifts (drifters only)	207	525	607	266	1,606
Feet of drilling (drifters only)	29,874	84,823	102,000	42,526	259,220
Average feet drilled per drill shift	145	161	168	160	160
Steel used (total number)	1,315	4,584	5,609	2,420	13,928
Steel used per drill shift (average number)	6.3	8.8	9.5	9	8.7
Per cent of steel broken	5.3	6.0	7.5	4.7	6.3
Total shifts, all drills					2,283[1]
Total repairs, all drills (including tanks, tripods, etc.)					$ 2,107
Repairs per drill shift					$ 0.92
Tons produced					388,285
Feet drilled per ton					0.67
Tons per drill shift (1,606 plus stoper 425 equals 2,031 shifts)					190
Steel-sharpener shifts					250
Steel-sharpener shifts per drill shift					0.11
Steel used per drill shift (average number)					8.7
Steel produced per sharpener shift					55
Repairs per sharpener shift					$0.60
Drill repairs per ton produced, 1929					$0.0054
Drill repairs per ton produced, 1928					.0053

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[1] This figure includes 252 drill shifts employed in block-holing or secondary drilling.

Note: The steel in 1¼ and ⅞-in. sizes contained 0.87 per cent carbon. Fifty per cent of the breakage is in the ⅞-in. steel used in stoper machines.

TABLE 8

Detailed Summary of Costs, January 1 to July 1, 1930

	Stone Per cent	Cost per ton	Shale Per cent	Cost per ton	Stone and Shale Per cent	Cost per ton
Loading:						
Total all shovels	----	$0.045	----	----	----	.039
Total all hand-loading	----	.045	----	$0.215	----	.075
Total loading	15.3	.090	36.3	.215	17.5	.104
Drilling:						
Operating labor	----	.098	----	.064	----	.095
Air	----	.010	----	.010	----	.010
Operating supplies	----	.011	----	.012	----	.012
Repair supplies	----	.006	----	.006	----	.006
Total drilling	21.3	.125	15.5	.092	20.6	.122
Blasting:						
Labor	----	.013	----	.007	----	.010
Explosives and other supplies	----	.095	----	.063	----	.092
Total blasting	18.3	.108	11.8	.070	17.2	.102
Haulage:						
Locomotives	----	.043	----	.043	----	.043
Trolley	----	.006	----	.006	----	.006
Cars	----	.011	----	.011	----	.011
Track maintenance	----	.053	----	.063	----	.054
Total haulage	19.1	.113	20.9	.123	19.1	.114
General charges	26.1	.154	15.5	.092	25.6	.151
Grand total	100	$0.590	100	$0.592	100	$0.593

ing costs, a summary of costs in units of labor, power and supplies, and a detailed summary of costs covering loading, drilling, blasting, haulage and general charges.

The number of men employed in the various sections and operations is shown in the complete organization chart, Figure 5.

Regular Quarterly Dividend Declared by Lehigh

The Lehigh Portland Cement Co. has declared the regular quarterly dividend of $1.75 on its preferred stock, payable October 1 to stock of record September 14.

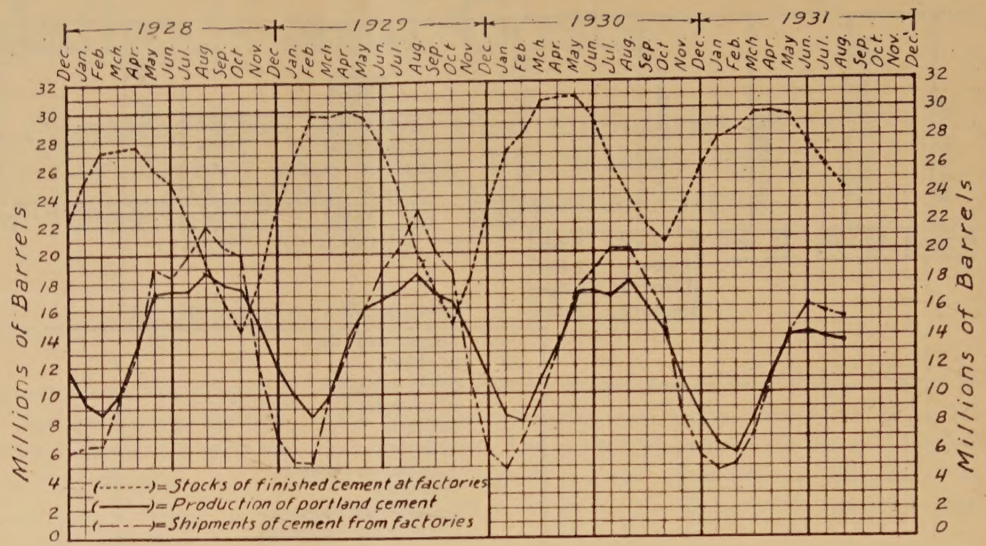
Cement Statistics for August

Cement Plants Operate at 60 Per Cent of Capacity During Summer Months

Relation of Production to Capacity

(Figures represent per cent)

	The Month	The Twelve Months
August, 1931	**60.2**	52.0
August, 1930	**81.0**	65.6
July, 1931	**62.0**	53.8
June, 1931	**65.4**	55.2
May, 1931	**62.8**	56.5



	1930	1931	Increase or Decrease, %
Production, August	**17,821,000**	13,549,000	—24.0
Shipments, August	**20,299,000**	15,172,000	—25.3
Stocks at end of month	23,824,000	**24,311,000**	2.0

	1930	1931	Increase or Decrease, %
Total production for year	**110,793,000**	87,581,000	—31.3
Total shipments for year	**110,590,000**	89,136,000	—29.9
No. of plants reporting	**166**	165	—.6

Production, Shipments, and Stocks of Finished Portland Cement, by Districts, in August, 1930 and 1931, and Stocks in July, 1931

District	Production—August 1930	Production—August 1931	Shipments—August 1930	Shipments—August 1931	Stocks at end of month 1930	Stocks at end of month 1931	Stocks at end of July, 1931*
Eastern Pa., N. J. and Md.	**3,676,000**	2,891,000	**4,161,000**	3,147,000	5,509,000	**5,770,000**	6,026,000
New York and Maine	**1,396,000**	1,375,000	**1,560,000**	1,556,000	1,298,000	**1,489,000**	1,669,000
Ohio, Western Pa. and W. Va.	**2,009,000**	1,296,000	**2,338,000**	1,353,000	3,190,000	**3,503,000**	3,559,000
Michigan	**1,426,000**	832,000	**1,627,000**	1,065,000	**2,418,000**	1,975,000	2,208,000
Wis., Ill., Ind. and Ky.	**2,409,000**	1,818,000	**3,045,000**	2,316,000	**3,295,000**	3,020,000	3,518,000
Va., Tenn., Ala., Ga., Fla. and La.	**1,232,000**	1,193,999	**1,328,000**	1,082,000	**1,794,000**	1,687,000	1,576,000
Eastern Mo., Ia., Minn. and S. Dak.	**1,933,000**	1,449,000	**2,491,000**	1,737,000	1,937,000	**2,474,000**	2,762,000
W. Mo., Nebr., Kans., Okla. and Ark.	**1,361,000**	987,000	**1,412,000**	1,121,000	**1,637,000**	1,490,000	1,624,000
Texas	**697,000**	644,000	**634,000**	667,000	**627,000**	603,000	626,000
Colo., Mont., Utah, Wyo. and Idaho	**302,000**	209,000	**292,000**	232,000	509,000	**585,000**	609,000
California	**922,000**	552,000	**961,000**	595,000	1,105,000	**1,114,000**	1,158,000
Oregon and Washington	**458,000**	303,000	**450,000**	301,000	505,000	**601,000**	599,000
	17,821,000	13,549,000	20,299,000	15,172,000	23,824,000	**24,311,000**	25,934,000

Production, Shipments, and Stocks of Finished Portland Cement, by Months, in 1930 and 1931

Month	—Production— 1930	—Production— 1931	—Shipments— 1930	—Shipments— 1931	Stocks at end of month 1930	Stocks at end of month 1931
January	**8,498,000**	6,595,000	**4,955,000**	4,692,000	27,081,000	**27,759,000**
February	**8,162,000**	5,920,000	**7,012,000**	5,074,000	28,249,000	**28,612,000**
March	**11,225,000**	8,245,000	**8,826,000**	7,192,000	**30,648,000**	29,676,000
April	**13,521,000**	11,245,000	**13,340,000**	11,184,000	**30,867,000**	29,715,000
May	**17,249,000**	14,010,000	**17,224,000**	14,200,000	**30,891,000**	29,554,000
June	**17,239,000**	14,118,000	**18,781,000**	16,077,000	**29,364,000**	27,602,000
July	**17,078,000**	13,899,000	**20,153,000**	15,545,000	**26,289,000**	*25,934,000
August	**17,821,000**	13,549,000	**20,299,000**	15,172,000	23,824,000	**24,311,000**
September	16,124,000	....	18,083,000	....	21,889,000	....
October	14,410,000	....	15,599,000	....	20,697,000	....
November	11,098,000	....	8,784,000	....	23,056,000	....
December	8,480,000	....	5,688,000	....	25,838,000	....
	160,905,000	....	158,744,000	....	....	....

Blacker type indicates larger of two figures.
*Revised.

MEN and MILLS

[NOTES FROM ✦ THE FIELD ✦]

Joseph McCracken New Sales Manager for Keystone Portland

The Keystone Portland Cement Company, Philadelphia, announces the appointment of Joseph B. McCracken as sales manager.

Mr. McCracken was formerly connected with the Atlas Portland Cement Company in New York and Chicago.

Fire Destroys Two Buildings at Utah-Idaho Plant

Fire of unknown origin destroyed the stockhouse and finish grinding department of the Utah-Idaho Cement Co. plant at Brigham, Utah, on August 30. The amount of the loss, covered by insurance, could not be estimated immediately.

Following the fire, the plant was placed on a part time basis until completion of repairs.

Robert Callihan, Wellston Mortar Superintendent, Resigns

Robert Callihan, Washington, D. C., superintendent of the Wifco mortar department of the Wellston Company's cement plant at Superior, Ohio, has resigned to accept a position with the Gulf Gasoline Co. at Pittsburgh.

Doings at Manheim

E. H. Bolyard, kiln burner for the Alpha Portland Cement Company at the Manheim, W. Va., plant, has recently purchased a farm and grist mill at Dent, W. Va., to which he moved his family in September.

Competitive potato growing is holding the spare time interest of many Alpha employes at present. A contest is on to see who can raise the most and the largest potatoes.

Honors are now held by F. S. Fretwell, foreman in the raw department, whose prize tuber weighs 25 oz.

Ora Hall, coal miller for the Alpha Portland Cement Co., recently took his wife to the Grafton City hospital, where she underwent an operation for appendicitis. Her condition is reported very serious and recovery is doubtful. The Halls are the parents of 12 children, all at home.

Cement Magnate Becomes Britain's New Transport Minister

Percy John Pybus, C.B.E., who is a director of Associated Portland Cement Manufacturers, Ltd., and British Portland Cement Manufacturers, Ltd., has been appointed minister of transport in the new national government. Apart from his cement interests, Mr. Pybus is on the boards of several other important industrial undertakings and is a director of the "London Times."

During his political career he has served on a number of royal commissions and public committees—among them the Royal Commission on the Civil Service, the Development Advisory Committee, and the Committee on Industry and Trade. Mr. Pybus is exceedingly popular in the Harwich division, which he represents as a Liberal in the House of Commons.

He was presented with an interesting transport problem in returning to London in time for the opening of Parliament, for at the time of his appointment he was en route to America. On arrival he found he just had time to catch the homeward-bound Mauretania. The New York-Plymouth route saved him nearly a day in the journey between the two capitals, and the special train landed him in London an hour and one-half before Parliament assembled. For five minutes he posed for the army of photographers awaiting him on the platform, and then left in a taxi direct for the House of Commons. Mr. Pybus is 51 years of age.

Blacksmith Breaks Heel Bone and Two-Year Perfect Safety Record

Seven hundred sixty days of accident-free operation at the La Salle, Ill., plant of the Alpha Portland Cement Company, were interrupted on September 20 when Frank Urbanski, blacksmith, was thrown from the body of the truck in which he was riding. He suffered a broken heel bone which will require eight weeks' hospital care.

The plant had dedicated its safety trophy on July 15.

Blank Pays Visit to Father and U. S.

Alton J. Blank, general superintendent and chief chemist of Compania de Cemento Portland "Landa," Puebla, Mexico, during September visited his father, John A. Blank, general superintendent of the Wellston Iron Furnace Company's cement plant at Superior, Ohio. He was accompanied by his family.

Readers will recall Mr. Blank as the author of a number of articles which have appeared under his name in recent issues of CONCRETE.

Mill Equipment

Pyro-Mortar Is New Bonding Cement; Its Features

Real bonding strength is claimed for Pyro-Mortar high temperature cement, a new product of Quigley Company, Inc., New York City.

Pyro-Mortar, according to the contents of a bulletin available from the manufacturer, actually bonds the fire brick with which it is used. It sets slowly at room temperatures, forming a strong bond that matures and gains its full strength under heat.

Pyro-Mortar is said to be remarkably stable, being practically neutral as to expansion and contraction. It is also claimed to be highly refractory, having a fusion point equal to that of first quality Pennsylvania, Kentucky, and Missouri fire brick.

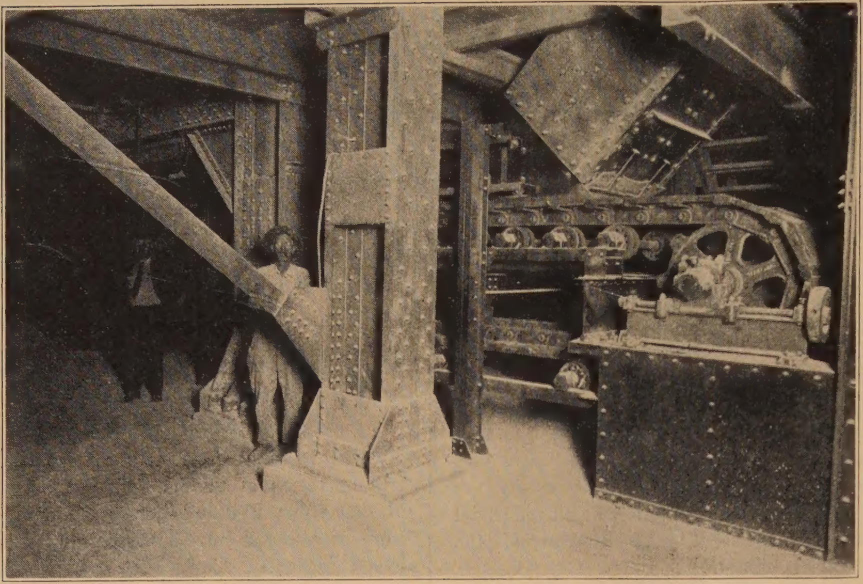
Mixed with water on the job, Pyro-Mortar develops a uniform, plastic body and stays in perfect suspension, the manufacturer states.

Use of Amsco Feeder in Handling Material

Since the Amsco feeder for handling bulk materials was first developed some years ago, several hundred installations have been made and are operating successfully, according to the American Manganese Steel Co., Chicago Heights, Ill.

The Amsco feeder is all manganese steel with the following major features of design, it is stated:

Smooth apron surface with floor and side flange overlap which prevent fouling, leakage and spillage.



Chains with one piece links, liberal pin surface and knee type joints which prevent sag between supporting track wheels.

No chain wear except when rounding drive sprocket.

No rollers in the chain.

No lubrication of chain parts.

No operating attention except lubrication of shaft bearings.

No floor shovel cleaning of leaks and spills.

An outstanding example of service under severe conditions, according to the firm, is that of an 8 by 72-ft. feeder at an angle of 18 deg., which has been operating for over 3½ years at 900 tons per hour, or about 8,000 tons per day. This is blocky copper ore mined by shovels with four-yard dippers and contains a rather high percentage of pieces weighing from one to five tons. There is no appreciable wear, there have been no repairs, the operation is clean, and no attention is required except lubrication of shafting, it is stated.

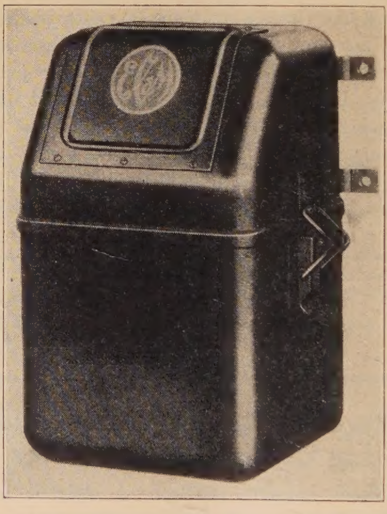
Amsco feeders are made in sizes to fit all conditions, from 2 ft. to 8½ ft. in width. Manganese parts are engineered and furnished by the American Manganese Steel Company and complete installations are engineered and furnished by the Stephens-Adamson Mfg. Co.

New EC&M Across-the-Line Motor Starter

A new motor starter now being produced by the Electric Controller & Mfg. Co., Cleveland, Ohio, is the No. 2 Type ZO across-the-line motor starter, a companion to the EC&M No. 1 ZO starter.

Like the latter, this is a self-contained unit, totally enclosed in a heavy pressed steel case with oil-immersed main and control circuit contacts and vapor-proof overload relays. The entire unit, the manufacturer states, is of compact design, requiring little mounting space, and is of dust-tight construction.

In designing these starters, it is further pointed out, particular attention has been given to the production of a starter exceptionally quiet and highly efficient in operation. This is accomplished by the use of a 3-pole E-shaped magnet, on the center pole of which is mounted the moisture-proof operating coil. The upper pole of this magnet is half shaded, the middle pole not shaded, and the lower pole completely shaded. This design is said to eliminate chattering and hum and to produce a uniform pull on the armature due to two additional fluxes of different phase angles superimposed upon and out of phase with the main flux produced by the line current.



A molded bakelite bushing is used in the arm bearing of the No. 2 Type ZO starter to make this part of the switch practically indestructible. This bushing also serves to insulate the bearing pin from the frame, thus breaking up a shading coil effect at this point and reducing the watt consumption of the coil considerably, it is stated.

Two thermal type overload relays are used in this starter. They are said to be accurately designed to protect motors against single phase and overload conditions. These starters are tested and shipped with overload relays set to trip at 125 per cent of full load motor current. When desired, however, this setting may easily be changed to any value between 100 and 150 per cent by turning a small knob located on the outside of the relay cover. These relays have high heat inertia to withstand heavy overloads, the heater elements being capable of safely withstanding 10 to 20 times full load motor current. These elements are arranged to be easily changed so that a No. 2 Type ZO of one rating can be easily and quickly converted to one of another horsepower rating.

This new starter may be used for low voltage release or low voltage protection applications. Standard, vapor-proof, or explosion-proof EC&M push buttons, described in Bulletin No. 1105, can be supplied for use with these starters.

Industrial Literature

Chain Grate Stokers

Chain Grate Stokers is the subject of a new bulletin issued by the *Babcock & Wilcox Company.*

The booklet contains full descriptions of the various types of stokers with suitable photographs and line drawings to illustrate each type. Typical setting views are shown, demonstrating the adaptability of the stokers to various types of boilers.

The bulletin is attractively bound and illustrated in colors.

Copies of this publication may be had by addressing the Babcock & Wilcox Company, 85 Liberty Street, New York, N. Y.

New Stedman Catalog

Catalog 302, just published by *Stedman's Foundry & Machine Works,* Aurora, Ind., embraces its *Type A* 2-stage swing and ring hammer grinders and pulverizers.

Various parts are shown in diagrammatic and close-up views and specifications and capacities are given.

Field Activities

Statler Joins Universal Bag

Following installation of the most modern and up-to-date bag making machinery available at its plant at New Hope, Pa., the *Universal Paper Bag Co.* announces it is now manufacturing high quality kraft multi-wall paper bags for cement.

Announcement is also made of the appointment of *E. T. Statler* to the multi-wall paper bag sales division. Mr. Statler has been identified with the multi-wall paper bag industry since its inception.